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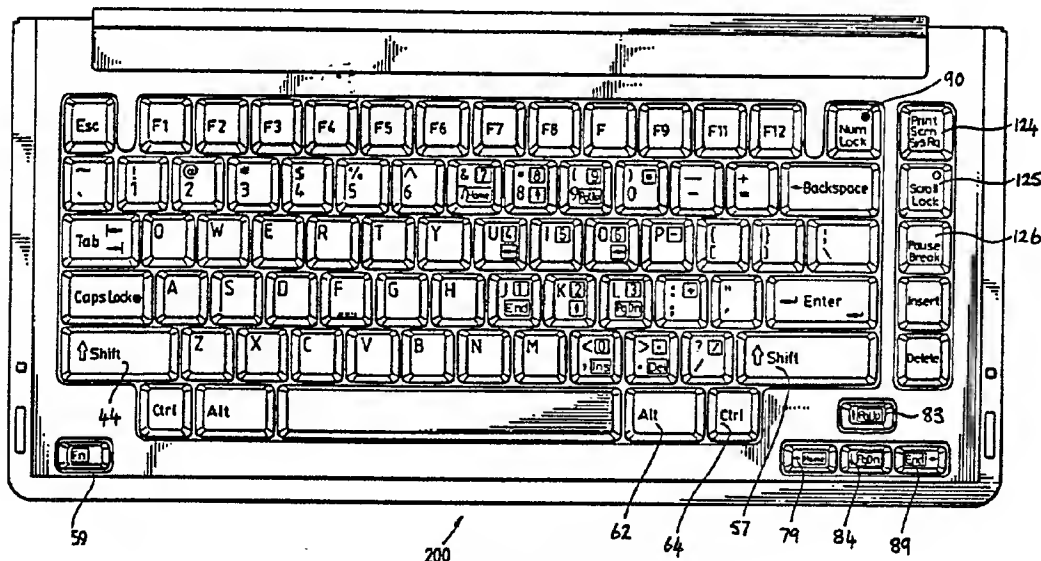
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(54) Keyboard apparatus.

(57) A new and unique embedded keypad is described which takes advantage of the number keys 7, 8 and 9 while providing a standard keypad arrangement for those with special proficiency in 10-key numeric keypads while at the same time providing cursor controls embedded in the embedded keypad, such special characters being implemented without a dedicated numeric keypad thereby reducing the physical space requirements for such features on a keyboard. The present invention relates to keyboard apparatus, necessary to accomplish a multitude of tasks, for a personal or portable computer without the incident physical space penalties associated with a prior art keyboard.

**FIG.1**



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## KEYBOARD APPARATUS

This invention relates to personal and portable computers typically designed with a standard typewriter keyboard arrangement. More particularly, the present invention relates to a keyboard for a personal computer used to input data to be store and/or displayed on a computer.

With the advent of the computer it became necessary to provide for a standard input interface. The typewriter keyboard arrangement was selected for the computer keyboard arrangement with the exception of special function keys such as the dedicated keypad, control, alternate, special function keys (e.g. F1, F2, F3, etc.), escape, number lock, and other such keys which were never contemplated on a standard typewriter. With the advent of the computer keyboard and the adoption of typewriter keyboard arrangement, designers of computer keyboards have struggled to properly locate the additional keys necessary for proper operation of a keyboard. As the sophistication of the computer has grown, so have the number of keys necessary for proper operation of computers with enhanced functions.

The additional keys necessary for a computer keyboard were typically accommodated by increasing the size of the keyboard. The size of the keyboard grew as necessary to accommodate the additional keys without any discomfort to the typist or computer operator. The increase in keyboard size did not pose any deleterious consequences for desktop computers.

As the demand for portable computers, and consequently smaller computers has grown, the need to reduce the size of the keyboard without sacrificing the functionality achieved with the additional keys which the computer user has come to expect for the additional functionality of the computer. Thus the designers of computer keyboards were required to produce smaller keyboards while maintaining all of the functionality of previous keyboards.

In accordance with the present invention, there is disclosed a keyboard for a personal portable computer with embedded keys arranged in manner which yields the full functionality of a desk-top computer keyboard without the physical size normally associated with desktop computer keyboards. It is a further object of the present invention to provide a numeric keypad arrangement without incurring the physical size penalty normally associated with a dedicated numeric keypad while at the same time providing cursor control keys in the embedded keypad.

It is an object of the present invention to provide a keyboard for a small footprint portable computer which has full-sized keys and yet achieves the full-functionality of a full-size keyboard approximately twice its size. It is a further object of the present invention to arrange the keys on such keyboard in such a manner which is logical and advantageous to those who have specific skills which result in improved and more efficient use of the keyboard and consequently a computer.

It is a further object of the present invention to provide an accountant, bookkeeper and other persons who have number intensive keyboard entry operations with a means to avail themselves of a dedicated numeric keypad to allow them to use the skills which they develop in pursuit of their daily activities, on a keyboard which is compact in size. It is a further object of the present invention to embed a numeric keypad in a manner which can be readily used in number intensive operations without the need for a dedicated numeric keypad.

Figure 1 illustrates a computer keyboard including the embedded numeric keypad and cursor control keys;

Figure 2 illustrates a portion of the keyboard which is illustrated in Figure 1 in an effort to illustrate the arrangement of the embedded numeric keypad and cursor control keys in an enlarged fashion.

Figure 3 is a schematic of the connection interface illustrating the interface between the keyboard and the computer system; and

Figure 4 illustrates the keyboard with the key numbers alone indicated on the key caps, for cross-reference with Table 1 and Table 2.

A new and unique numeric keypad arrangement is disclosed in the present invention. As illustrated in Figure 1 (and more particularly in Figure 2) the keys of keyboard 200 are arranged in the second, third, fourth and fifth rows to provide keys which serve up to four separate and distinct functions. For example number keys for the numerals 7, 8, and 9 operate in the normal keyboard operation for the numbers 7, 8 and 9. Whenever the "Shift" key 44 or 57 is depressed the keys 7, 8, and 9 operate in the normal manner as in a typewriter to wit to yield the "&", ":", "(", "}" characters respectively. Other character and number keys on the keyboard behave in a similar fashion as those keys found on a standard typewriter or prior art computer keyboard.

The number keys and the keys in the embedded keypad (shown in Figure 2) have two additional features however depending on whether the "Num Lock" key 90 is depressed and/or the Fn key 59 is

depressed. By depressing a combination of the Num Lock key 90 and/or the Fn key 59 the cursor control keys in the embedded keyboard are utilized or the numeral keys are utilized. The various functions for the embedded keys are illustrated in Figure 2.

In the case of the numbers 7, 8 and 9 the numbers yielded when the Num Lock key 90 is depressed are the numbers 7, 8 and 9 respectively. However, in the case of the letters and characters u, i, o, p, j, k, l, and other keys illustrated in Figure 2; the arrangement of the underlying embedded keys resembles a standard numeric keypad of the type commonly associated with an adding machine or calculator.

The present keyboard 200 has two modes of operation; normal and select. The default mode at computer system power-up shall be the normal mode. Enhanced operation will be available in the normal mode. A "Function" key 59, additional to the twelve standard function keys, and designated as "Fn" will provide access to the embedded numeric keys and cursor/screen control keys. Each mode is more specifically described below.

In the normal mode, an 11-bit scan code for bidirectional communication between keyboard and system unit is used. Each key has an individual make code and break code. The break code is transmitted after the key is released. These codes are jointly referred to as the scan code. Normal mode scan codes are listed in Table 1 attached.

The select mode also uses an 11-bit bi-directional interface and the default scan codes are listed in Table 2. The select mode is system selectable via software and allows any individual key or all keys to be re-assigned to one of the following states:

- Make only operation
- Make/Break operation
- Typematic only operation
- Typematic and Make/Break operation

The keyboard will be uniquely configured to emulate enhanced operation; i.e. QWERTY, Numeric Pad and Cursor Control Keys. This is accomplished by an embedded numeric pad and separate cursor keys as illustrated in Figure 2. the embedded numeric pad is enabled/disabled via the Num Lock key 90. When enabled, embedded numeric keys illustrated in Figure 2, will transmit the key codes of an enhanced numeric pad provided the optional keypad (not shown in Figure 1) is not attached to the back of the keyboard. When the optional keypad is attached, the embedded numeric pad is disabled via the keyboard, and the embedded numeric keys (more fully illustrated in Figure 2) will normally transmit alpha codes - regardless of the state of the Num Lock key 90.

Dedicated cursor control keys 79, 83, 84, and 89 always transmit enhanced codes regardless of the state of Num Lock 90 or the presence of the optional keypad.

In addition to the above-mentioned keys, the following key stations also transmit enhanced codes: 62, 64, 124, 125, 126. The key codes are designated on the key caps in Figure 4.

The Num Lock 90 key provides access to the embedded numeric keys illustrated in Figure 1 (more fully illustrated in Figure 2) provided that the optional keypad (not shown) is not attached. The SENSE line (see Figure 3) detects the presence of the optional keypad. If the keypad is attached, the status of the Num Lock key LED (light emitting diode not shown) determines if scan codes from the embedded keypad are interpreted by the keyboard system as digits or cursor/screen control functions.

Operation of the Fn key 59 is unique; its only purpose is to flag the keyboard processor. No codes are sent across the system interface. The operation of Fn 59 depends on the state of the Num Lock Key:

- With Num Lock off (LED off), the operation of Fn 59 and an embedded numeric key together transmits the enhanced numeric scan code of a key, or the screen control code of the cursor keys.
- With Num Lock on (LED on), operation Fn and an embedded numeric key transmits the default (alpha) scan code of a key or the screen control code of the cursor keys.

All scan codes accessed via Fn 59 will send complete make/break codes. For example, if Fn is released while an embedded numeric key is still pressed, the break code of the embedded character must be transmitted before any subsequent made code is sent. This will occur regardless of the state of the Num Lock or keypad presence.

The following matrix describes the combined effects of the optional keypad, Fn key 59 and Num Lock key 90. Embedded numeric keys in the QWERTY section are distinguished by shell coloured legends in a solid black quadrant, or by a black boxed legend, however these colors should not be viewed as a limitation of the invention.

	Num Lock ON	Num Lock OFF
5 Keypad Installed	Embedded Numerics - Disabled Keypad Numerics - Enabled Keyboard Cursor controls - Functional Screen control - via Fn	Keypad Numerics - Disabled Embedded Numerics - Disabled Keyboard Cursor controls - Functional Screen control - via Fn
10 Keypad Not Installed	Embedded Numerics - Enabled Hold Down Fn key for Alpha functions Cursor controls - Functional Screen control - via Fn	Alpha functions - Enabled Hold Down Fn key for Numeric functions Cursor control - Functional Screen control - via Fn

15 As illustrated in the attached Figures and described above, a new and unique embedded keypad has been invented which takes advantage of the number keys 7, 8 and 9 while providing a standard keypad arrangement for those with special proficiency in 10-key numeric keypads while at the same time provide cursor controls embedded in the embedded keypad.

**TABLE 1 NORMAL MODE SCAN CODES**  
(Page 1 of 7)

KEY NUMBER	KEY CAP COLOR	MAKE CODE	BREAK CODE
1	2	0E	FO 0E
2	2	16	FO 16
3	2	1E	FO 1E
4	2	26	FO 26
5	2	25	FO 25
6	2	2E	FO 2E
7	2	36	FO 36
8	2	3D	FO 3D
9	2	3E	FO 3E
10	2	46	FO 46
11	2	45	FO 45
12	2	4E	FO 4E
13	2	55	FO 55
* 14	1	6A	FO 6A
15	1	66	FO 66
16	1	0D	FO 0D
17	2	15	FO 15
18	2	1D	FO 1D
19	2	24	FO 24
20	2	2D	FO 2D
21	2	2C	FO 2C
22	2	35	FO 35
23	2	3C	FO 3C
24	2	43	FO 43
25	2	44	FO 44
26	2	4D	FO 4D
27	2	54	FO 54
28	2	5B	FO 5B
29*	2	5D	FO 5D
30	1	58	FO 58
31	2	1C	FO 1C

\* = U.S.A.    \*\* = International    # = Reserved

These keys are located on 80 81 85 86 91 92 93 94  
the optional numeric pad: 95 96 97 98 99 100 101  
102 103 104 105 106 108

These (cursor) keys are duplicated  
on the optional numeric pad 79 83 84 89

**TABLE 1 NORMAL MODE KEY SCAN CODES**  
(Page 2 of 7)

KEY NUMBER	KEY CAP COLOR	MAKE CODE	BREAK CODE
32	2	1B	FO 1B
33	2	23	FO 23
34	2	2B	FO 2B
35	2	34	FO 34
36	2	33	FO 33
37	2	3B	FO 3B
38	2	42	FO 42
39	2	4B	FO 4B
40	2	4C	FO 4C
41	2	52	FO 52
42**	2	5D	FO 5D
43	1	5A	FO 5A
44	1	12	FO 12
45**	2	61	FO 61
46	2	1A	FO 1A
47	2	22	FO 22
48	2	21	FO 21
49	2	2A	FO 2A
50	2	32	FO 32
51	2	31	FO 31
52	2	3A	FO 3A
53	2	41	FO 41
54	2	49	FO 49
55	2	4A	FO 4A
# 56	1	51	FO 51
57	1	59	FO 59
58	1	14	FO 14
59	1	No scan code out to interface	
60	1	11	FO 11
61	2	29	FO 29
62	1	EO 11	EO FO 11
64	1	EO 14	EO FO 14

\* = U.S.A.    \*\* = International    # = Reserved

**TABLE 1 NORMAL MODE SCAN CODES**  
(Page 3 of 7)

KEY NUMBER	KEY CAP COLOR	MAKE CODE	BREAK CODE
75....90.....		see pages 5, 6 & 7 of 7	
90	1	77	FO 77
91 +	2	6C	FO 6C
92 +	2	6B	FO 6B
93 +	2	69	FO 69
* 94 +	2	68	FO 68
95 +	2	see pages 5 & 6 of 7	
96 +	2	75	FO 75
97 +	2	73	FO 73
98 +	2	72	FO 72
99 +	2	70	FO 70
100 +	1	7C	FO 7C
101 +	2	7D	FO 7D
102 +	2	74	FO 74
103 +	2	7A	FO 7A
104 +	2	71	FO 71
105 +	1	7B	FO 7B
106 +	1	79	FO 79
* 107 +	1	6D	FO 6D
108 +	1	EO 5A	EO FO 5A
* 109 +	1	63	FO 63
110	1	76	FO 76
112	1	05	FO 05
113	1	06	FO 06
114	1	04	FO 04
115	1	0C	FO 0C
116	1	03	FO 03
117	1	0B	FO 0B
118	1	83	FO 83
119	1	0A	FO 0A
120	1	01	FO 01
121	1	09	FO 09
122	1	78	FO 78
123	1	07	FO 07
125	1	7E	FO 7E

\* = U.S.A.      \*\* = International      # = Reserved  
+ = on Numeric keypad

TABLE 1 NORMAL MODE SCAN CODES  
(Page 4 of 7)

KEY NO.	KEY CAP COLOR	BASE CASE, or Shift+Num Lock MAKE / BREAK	Shift case (see note below) MAKE / BREAK	Num Lock ON MAKE / BREAK
75	1	EO 70 / EO FO 70	EO FO 12 EO 70/ EO FO 70 EO 12	EO 12 EO 70/ EO FO 70 EO FO 12
76	1	EO 71 / EO FO 71	EO FO 12 EO 71/ EO FO 71 EO 12	EO 12 EO 71/ EO FO 71 EO FO 12
79 +	1	EO 6B / EO FO 6B	EO FO 12 EO 6B/ EO FO 6B EO 12	EO 12 EO 6B/ EO FO 6B EO FO 12
80 +	1	EO 6C / EO FO 6C	EO FO 12 EO 6C/ EO FO 6C EO 12	EO 12 EO 6C/ EO FO 6C EO FO 12
81 +	1	EO 69 / EO FO 69	EO FO 12 EO 69/ EO FO 69 EO 12	EO 12 EO 69/ EO FO 69 EO FO 12
83 +	1	EO 75 / EO FO 75	EO FO 12 EO 75/ EO FO 75 EO 12	EO 12 EO 75/ EO FO 75 EO FO 12
84 +	1	EO 72 / EO FO 72	EO FO 12 EO 72/ EO FO 72 EO 12	EO 12 EO 72/ EO FO 72 EO FO 12
85 +	1	EO 7D / EO FO 7D	EO FO 12 EO 7D/ EO FO 7D EO 12	EO 12 EO 7D/ EO FO 7D EO FO 12
86 +	1	EO 7A / EO FO 7A	EO FO 12 EO 7A/ EO FO 7A EO 12	EO 12 EO 7A/ EO FO 7A EO FO 12
89 +	1	EO 74 / EO FO 74	EO FO 12 EO 74/ EO FO 74 EO 12	EO 12 EO 74/ EO FO 74 EO FO 12
		BASE CASE MAKE/BREAK	SHIFT CASE MAKE/BREAK	
95 +	1	EO 4A / EO FO 4A	EO FO 12 EO 4A/ EO FO 4A EO 12	
<b>Note:</b> IF SHIFT KEY 44 IS DOWN, THE FO 12/12 MAKE/BREAK IS SENT WITH THE OTHER SCAN CODES. WHEN SHIFT KEY 57 IS DOWN, THE FO 59/59 IS TRANSMITTED. WHEN BOTH SHIFT KEYS ARE DOWN, BOTH SETS OF MAKE/BREAK CODES ARE TRANSMITTED WITH THE KEY SCAN CODE.				

+ = on Numeric keypad



TABLE 1 NORMAL MODE SCAN CODES  
(Page 5 of 7)

KEY NUMBER	KEY CAP COLOR	BASE CASE MAKE/BREAK	<Ctrl + Shift> MAKE / BREAK	< Alt > MAKE/BREAK
124	1	E0 12 E0 7C/ E0 F0 7C E0 F0 12	E0 7C / E0 F0 7C	84 / F0 84
NORMAL MAKE CODE			<Ctrl> KEY PRESSED	
126	1	E1 14 77 E1 F0 14 F0 77	E0 7E E0 F0 7E	
KEY 126 IS NOT TYPEMATIC, ALL SCAN CODES OF ASSOCIATED KEYS OCCUR ON THE "MAKE" OF THE KEY.				

KEY STATION NUMBER	TYPEMATIC MAKE CODE	TYPEMATIC BREAK CODE
75	E0 70	SEE PAGE 4 OF THIS TABLE FOR THE BREAK CODES FOR EACH KEY CONDITION
76	E0 71	
79	E0 6B	
80	E0 6C	
81	E0 69	
83	E0 75	
84	E0 72	
85	E0 7D	
86	E0 7A	
89	E0 74	
95	E0 4A	
124	E0 7C	
124 (Base Case + Alt)	84	

**TABLE 1 NORMAL MODE SCAN CODES**  
(PAGE 6 of 7)

There are two conditions that require the shift break code transmitted before the second keystation make scan code.

Condition 1 - Enhanced keystation pressed in combination with either shift key and any third keystation.

Condition 2 - Num Lock enabled. Enhanced keystation pressed and any second keystation pressed.

If one of the following Enhanced keystations is pressed, the keyboard transmits the first half of the BREAK scan code for the first station (break code for the shift) as shown below.

The keyboard then transmits the second station MAKE scan code.

On release of the first station the keyboard will transmit the remaining BREAK scan code for the first station pressed.

Normal keyboard operations continue after the second station MAKE scan code is transmitted.

KEY NO.	CONDITION 1		CONDITION 2
	Left-Shift Key	Right-Shift Key	Num Lock ON
75	E0 12	E0 59	E0 F0 12
76	E0 12	E0 59	E0 F0 12
79	E0 12	E0 59	E0 F0 12
80	E0 12	E0 59	E0 F0 12
81	E0 12	E0 59	E0 F0 12
83	E0 12	E0 59	E0 F0 12
84	E0 12	E0 59	E0 F0 12
85	E0 12	E0 59	E0 F0 12
86	E0 12	E0 59	E0 F0 12
89	E0 12	E0 59	E0 F0 12
95	E0 12	E0 59	-----
124	-----	-----	E0 F0 12

TABLE 1 NORMAL MODE SCAN CODES  
(Page 7 of 7)

Key No.	Num Lock (ON) or Fn + Num Lock (OFF) MAKE / BREAK		Fn + Num Lock (ON) MAKE / BREAK	
8	6C / F0 6C		3D / F0 3D	
9	75 / F0 75		3E / F0 3E	
10	7D / F0 7D		46 / F0 46	
11	7C / F0 7C		45 / F0 45	
23	6B / F0 6B		3C / F0 3C	
24	73 / F0 73		43 / F0 43	
25	74 / F0 74		44 / F0 44	
26	7B / F0 7B		4D / F0 4D	
37	69 / F0 69		3B / F0 3B	
38	72 / F0 72		42 / F0 42	
39	7A / F0 7A		4B / F0 4B	
40	79 / F0 79		4C / F0 4C	
43	E0 5A / E0 F0 5A		5A / F0 5A	
53	70 / F0 70		3A / F0 3A	
54	71 / F0 71		41 / F0 41	
55	E0 4A / E0 F0 4A		4A / F0 4A	
CURSOR KEYS	Num Lock ON		Num Lock OFF	
	BASE CASE MAKE / BREAK	Fn + CURSOR MAKE / BREAK	BASE CASE MAKE/BREAK	Fn + CURSOR
79	E0 12 E0 6E / E0 F0 6B E0 F0 12	E0 12 E0 6C / E0 F0 6C E0 F0 12	E0 6B / E0 F0 6B	E0 6C / E0 F0 6C
83	E0 12 E0 75 / E0 F0 75 E0 F0 12	E0 12 E0 7D / E0 F0 7D E0 F0 12	E0 75 / E0 F0 75	E0 7D / E0 F0 7D
84	E0 12 E0 72 / E0 F0 72 E0 F0 12	E0 12 E0 7A / E0 F0 7A E0 F0 12	E0 72 / E0 F0 72	E0 7A / E0 F0 7A
89	E0 12 E0 74 / E0 F0 74 E0 F0 12	E0 12 E0 69 / E0 F0 69 E0 F0 12	E0 74 / E0 F0 74	E0 69 / E0 F0 69

**NOTE:**

The "SHIFT CASE" for keys 43, 55, 79, 83, 84, and 89 will conform to the scan code transmission sequence on pages 4 and 6 of this table

TABLE 2 SELECT MODE SCAN CODES  
(Page 1 of 4)

KEY NUMBER	MAKE CODE	BREAK CODE	DEFAULT KEY STATE
1	0E	F0 0E	TYPEMATIC
2	16	F0 16	"
3	1E	F0 1E	"
4	26	F0 26	"
5	25	F0 25	"
6	2E	F0 2E	"
7	36	F0 36	"
8	3D	F0 3D	"
9	3E	F0 3E	"
10	46	F0 46	"
11	45	F0 45	"
12	4E	F0 4E	"
13	55	F0 55	"
* 14	5D	F0 5D	"
15	6C	F0 6C	"
16	0D	F0 0D	"
17	15	F0 15	"
18	1D	F0 1D	"
19	24	F0 24	"
20	2D	F0 2D	"
21	2C	F0 2C	"
22	35	F0 35	"
23	3C	F0 3C	"
24	45	F0 45	"
25	44	F0 44	"
26	4D	F0 4D	"
27	54	F0 54	"
28	55	F0 55	"
29*	5C	F0 5C	"
30	14	F0 14	MAKE/BREAK
31	1C	F0 1C	TYPEMATIC
32	1E	F0 1E	"
33	23	F0 23	"
34	2B	F0 2B	"
35	34	F0 34	"
36	33	F0 33	"
37	3B	F0 3B	"
38	42	F0 42	"
39	4B	F0 4B	"
40	4C	F0 4C	"

\* = U.S.A. \*\* = International # = Reserved

These keys are located on 80 81 85 86 91 92 93 94 95 96 97  
the optional numeric pad: 98 99 100 102 103 104 105 106 107 108 109

These (cursor) keys are duplicated on the optional numeric pad: 79, 83, 84, 85

TABLE 2 SELECT MODE SCAN CODES  
(Page 2 of 4)

KEY NUMBER	MAKE CODE	BREAK CODE	DEFAULT KEY STATE
41	52	F0 52	TYPEMATIC
42**	53	F0 53	"
43	5A	F0 5A	"
44	12	F0 12	MAKE/BREAK
45**	13	F0 13	TYPEMATIC
46	1A	F0 1A	"
47	22	F0 22	"
48	21	F0 21	"
49	2A	F0 2A	"
50	32	F0 32	"
51	31	F0 31	"
52	3A	F0 3A	"
53	41	F0 41	"
54	49	F0 49	"
55	4A	F0 4A	"
* 56	51	F0 51	"
57	59	F0 59	MAKE/BREAK
58	11	F0 11	"
59	No scan code out to interface		
60*	19	F0 19	"
61	29	F0 29	TYPEMATIC
62	39	F0 39	MAKE ONLY
64	58	F0 58	"
75	67	F0 67	"
76	64	F0 64	TYPEMATIC
79 +	61	F0 61	"
80 +	6E	F0 6E	MAKE ONLY
81 +	65	F0 65	"
83 +	63	F0 63	TYPEMATIC
84 +	60	F0 60	"
85 +	6F	F0 6F	MAKE ONLY
86 +	6D	F0 6D	"
89 +	6A	F0 6A	TYPEMATIC
90	76	F0 76	MAKE ONLY
91 +	6C	F0 6C	"
92 +	6B	F0 6B	"
93 +	69	F0 69	"
* 94 +	68	F0 68	"
95 +	77	F0 77	"
96 +	75	F0 75	"
97 +	73	F0 73	"
98 +	72	F0 72	"
99 +	70	F0 70	"

\* = U.S.A. \*\* = International # = Reserved

TABLE 2 SELECT MODE SCAN CODES  
(Page 3 of 4)

KEY NUMBER	MAKE CODE	BREAK CODE	DEFAULT KEY STATE
100 +	7E	F0 7E	MAKE ONLY
101 +	7D	F0 7D	"
102 +	74	F0 74	"
103 +	7A	F0 7A	"
104 +	71	F0 71	"
105 +	84	F0 84	"
106 +	7C	F0 7C	TYPEMATIC
*107 +	7B	F0 7B	"
108 +	79	F0 79	MAKE ONLY
*109 +	78	F0 78	"
110	08	F0 08	"
111	07	F0 07	"
112	0F	F0 0F	"
113	17	F0 17	"
114	1F	F0 1F	"
115	27	F0 27	"
116	2F	F0 2F	"
117	37	F0 37	"
118	3F	F0 3F	"
119	47	F0 47	"
120	4F	F0 4F	"
121	56	F0 56	"
122	5E	F0 5E	"
123	57	F0 57	"
124	5F	F0 5F	"
125	62	F0 62	"
126			

\* = U.S.A. \*\* = International \* = Reserved  
+ = on Numeric keypad

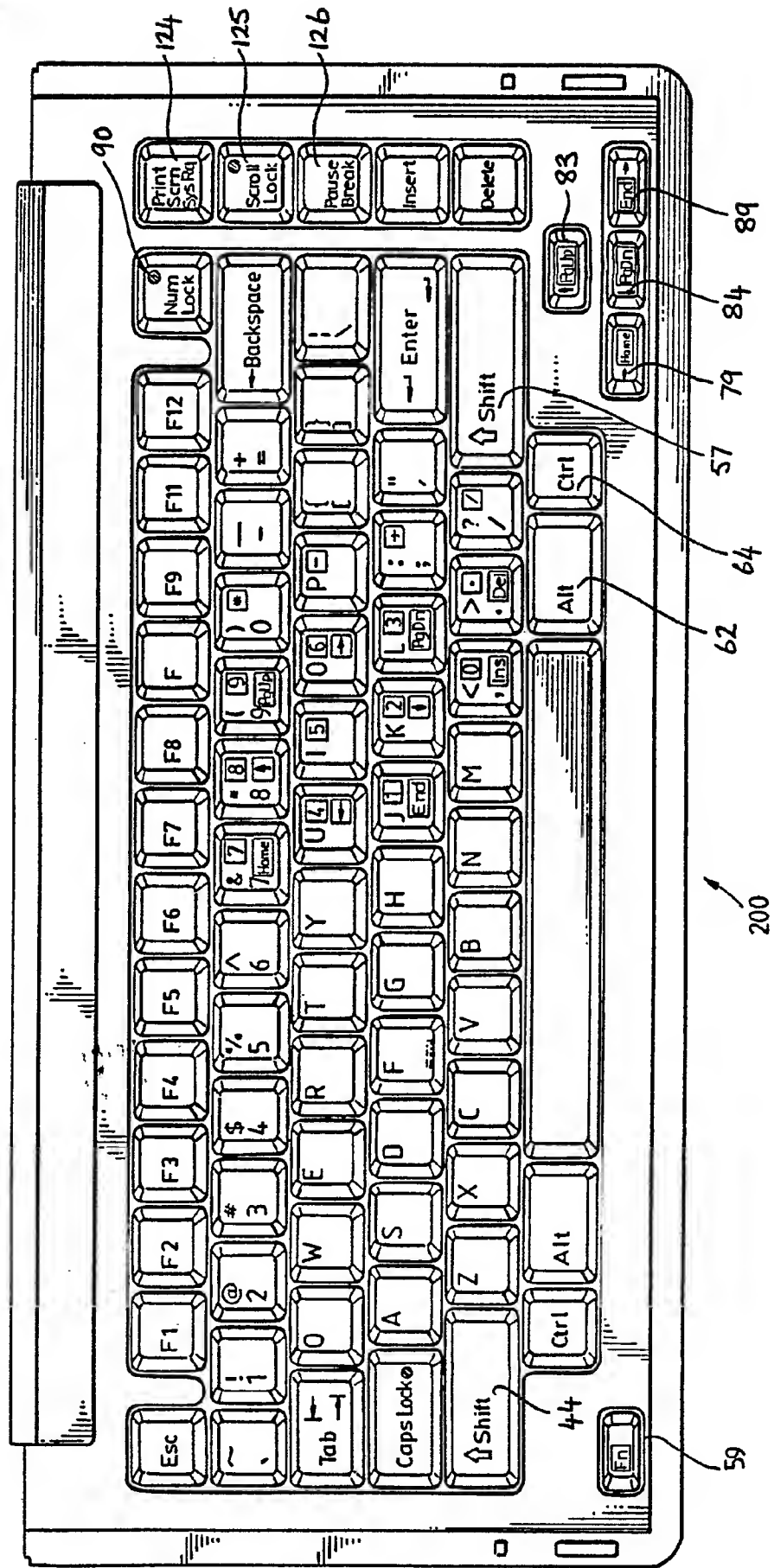
TABLE 2 SELECT MODE SCAN CODES  
(Page 4 of 4)

	Num Lock (ON) or Fn + Num Lock (OFF) MAKE / BREAK	DEFAULT STATE	Fn + Num Lock (ON) MAKE / BREAK	DEFAULT STATE
5	8 6C / F0 6C	make only	3D / F0 3D	typenatic
	9 75 / F0 75	"	3E / F0 3E	"
10	10 7D / F0 7D	"	46 / F0 46	"
	11 7E / F0 7E	"	45 / F0 45	"
	23 6B / F0 6B	"	3C / F0 3C	"
	24 73 / F0 73	"	43 / F0 43	"
	25 74 / F0 74	"	44 / F0 44	"
	26 84 / F0 84	"	4D / F0 4D	"
15	37 69 / F0 69	"	3B / F0 3B	"
	38 72 / F0 72	"	42 / F0 42	"
	39 7A / F0 7A	"	4B / F0 4B	"
	40 7C / F0 7C	typenatic	4C / F0 4C	"
	43 79 / F0 79	make only	5A / F0 5A	"
	53 70 / F0 70	"	41 / F0 41	"
20	54 71 / F0 71	"	49 / F0 49	"
	55 77 / F0 77	"	4A / F0 4A	"
	Fn + Num Lock ON or OFF			
	MAKE / BREAK			
25	79 6E / F0 6E	make only	Cursor key	
	83 6F / F0 6F	"	Cursor key	
	84 6D / F0 6D	"	Cursor key	
	89 65 / F0 65	"	Cursor key	

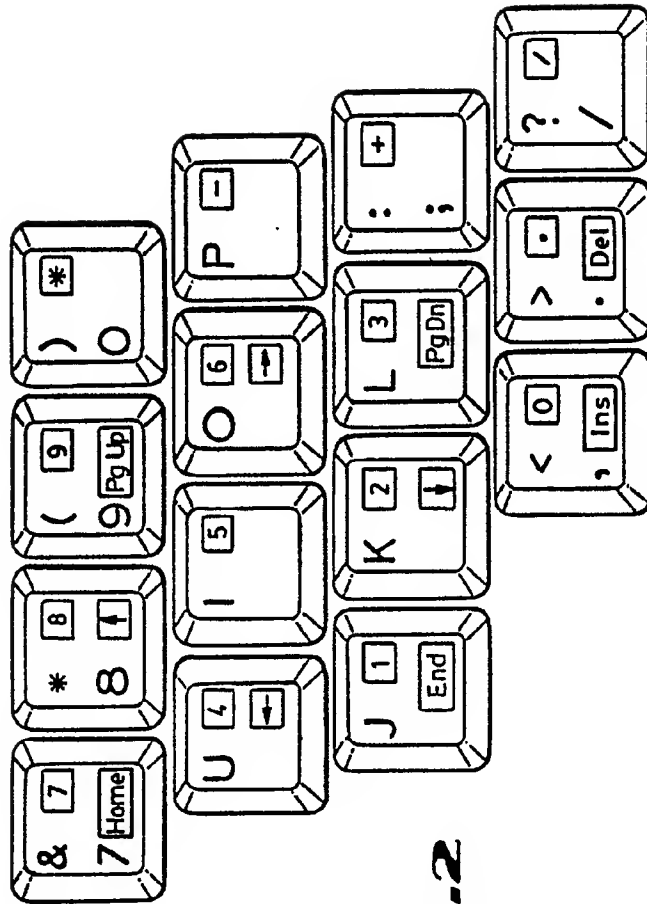
## Claims

1. A keyboard (200) for a computer system comprising the following:
  - a) a standard typewriter keyboard arrangement with lower case and upper case letter capabilities.
  - b) cursor control keys embedded in said keyboard arrangement, and
  - c) a numeric keypad embedded in said keyboard arrangement.
2. A keyboard according to claim 1, further comprising a special function key (59) which enables the embedded cursor control keys and disables the standard keyboard arrangement and the embedded numeric keys.
3. A keyboard according to claim 1 or claim 2, further comprising a Num Lock key (90) which enables the embedded numeric keypad and disables the standard keyboard arrangement and the cursor control keys.

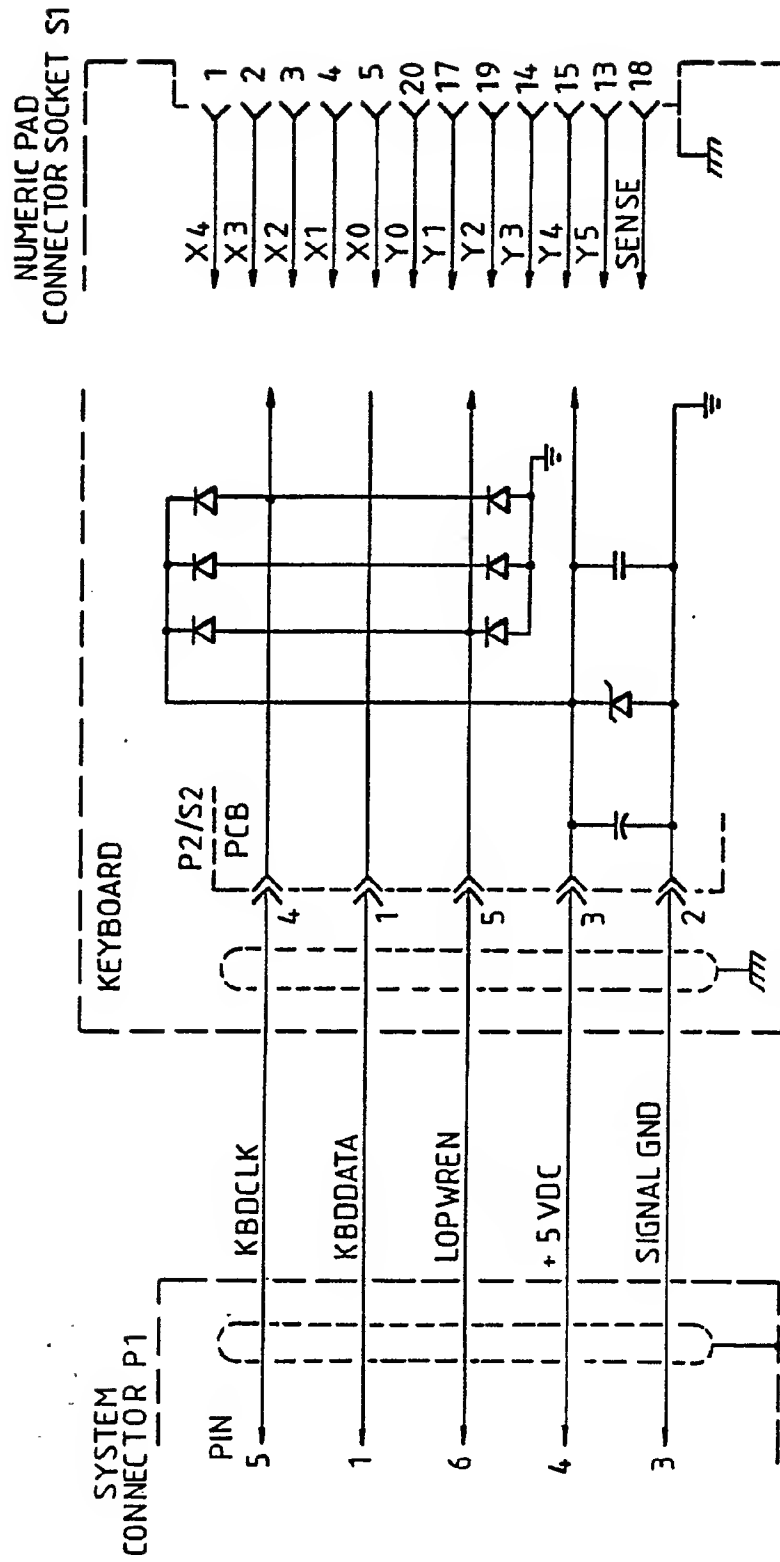
**FIG. 1**







**FIG. 2**



**FIG.3**

CONNECTOR  
SHELL

**Fig. 4**

